

Engineering Data

Stromberg-Carlson No. 228 Radio Receivers

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
Rochester, New York

ELECTRICAL SPECIFICATIONS

| | | |
|-------------------------------------|--|--|
| Type of Circuit | Superheterodyne | |
| Tuning Ranges | A—540 to 1500 Kc.; B—1450 to 3500 Kc.; C—5900 to 18,000 Kc. | |
| Number and Types of Tubes | 1 No. 6A8, 1 No. 6K7, 1 No. 6Q7, 1 No. 6F6G, 1 No. 6G5, 1 No. 5Y4G | |
| Voltage Rating | 105 to 125 Volts, A. C. | |
| Input Power Frequency | 25 to 60 Cycles and 50 to 60 Cycles | |
| Input Power Rating | 56 Watts | |
| Frequency of Intermediate Amplifier | 465 Kilocycles | |

APPARATUS SPECIFICATIONS

| | |
|---------------------|--|
| No. 228-H Receiver | 50 to 60 Cycles; P-27543 Chassis; P-27557 Loud Speaker |
| No. 228-HB Receiver | 25 to 60 Cycles; P-27544 Chassis; P-27557 Loud Speaker |
| No. 228-L Receiver | 50 to 60 Cycles; P-27543 Chassis; P-27605 Loud Speaker |
| No. 228-LB Receiver | 25 to 60 Cycles; P-27544 Chassis; P-27605 Loud Speaker |

CIRCUIT DESCRIPTION

These receivers are six tube superheterodyne receivers employing metal tubes and a highly efficient dynamic speaker. There are three tuning ranges; the limits of each tuning range are listed under the "Electrical Specifications" given above. These receivers are also equipped with a low level bass frequency compensating network, which in conjunction with the volume control circuit gives balanced reproduction at any setting of the volume control.

The various tubes are used in these receivers as follows: The No. 6A8 tube functions as both Modulator and Oscillator. The No. 6K7 tube is used in the I. F. Amplifier and the No. 6Q7 tube is used as the Demodulator, A. V. C., and Audio Amplifier tube. The No. 6F6G tube is used in the Audio Power Output Stage and the No. 6G5 tube is used for indicating resonance in the Tuning Indicator System. The No. 5Y4G is the Rectifier tube of the power supply unit.

NORMAL VOLTAGE READINGS

The various values of voltages listed in the following table are obtained by measuring between the various tube socket contacts and the chassis base, with the tubes in their respective sockets. The receiver is, therefore, in operation when the measurements are made. Figure 1, shows the terminal layout of the sockets with the proper terminal numbers.

Voltages are given for a line voltage of 120 volts, and allowance should be made for differences when the line voltage is higher or lower. A meter having a resistance of 1000 ohms per volt should be used for measuring the D. C. voltages. Voltage values shown are those obtained on the lowest possible scale of a meter having the following ranges: 0-2.5, 0-10, 0-100, 0-250, 0-500, 0-1000 volts except when an asterisk appears after any given voltage value in which case the 250 volt scale was used.

| Tube | Circuit | Cap | Terminals of Sockets | | | | | | | | Heater Voltages Between Heater Terminals | |
|----------------|-------------------------|-----|----------------------|-------|------|------|------|------|------|------|--|-------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Socket Terminal Numbers | Volts |
| 6A8 | Mod.—Osc. | 0 | 0 | 0 | +210 | +65 | -20 | +180 | 6.1 | +1.6 | 2-7 | 6.1 |
| 6K7 | I. F. Amp. | 0 | 0 | 0 | +220 | +90 | +2.5 | — | 6.1 | +2.5 | 2-7 | 6.1 |
| 6Q7 | Dem.—A. V. C. —Audio | 0 | 0 | 0 | +100 | 0 | 0 | +100 | 6.1 | +1.6 | 2-7 | 6.1 |
| 6F6G | Audio Output | — | 0 | 0 | +210 | +220 | 0 | 0 | 6.1 | +13 | 2-7 | 6.1 |
| 6G5 | Tuning Ind. | — | 0 | +2.4* | 0 | +220 | — | 6.1 | | | 1-6 | 6.1 |
| 5Y4G | Rectifier | — | 0 | 0 | 335 | — | 335 | — | +340 | +344 | 7-8 | 4.9 |
| Speaker Socket | | — | +340 | 0 | 0 | +340 | +340 | — | +220 | | | |

Receiver tuned to 1000 Kc., no signal. A. C. voltages are indicated by italics.

ALIGNMENT DATA

All alignment adjustments are accurately made at the factory on these receivers, and ordinarily no readjustments are necessary. However, should it become necessary to make any readjustments, the alignment procedure given in the following paragraphs should be carefully followed. In order to make these aligning adjustments in an easy and satisfactory manner, it is recommended that the Stromberg-Carlson P-24608 aligning tool be used.

To accurately align the circuits in these receivers, it is necessary to use a high grade, modulated test oscillator (Signal Generator), the output voltage of which can be varied. In conjunction with this test oscillator, a sensitive output meter should be used for determining the maximum signal voltage developed across the voice coil of the loud speaker.

In making any alignment adjustments, always adjust the test oscillator's output voltage to the minimum value where a good alignment may still be obtained. Never attempt to make any alignment adjustments using a strong signal. Before proceeding with the alignment of any circuits in these receivers be sure that the "Off-On-Tone" control knob is set for maximum treble response (position where knob is rotated from its maximum counter-clockwise position, slightly clockwise to position where set turns "on"). Figure 1, shows the location of all the aligning capacitors in these receivers.

In making any alignment adjustments on these receivers, it will not be necessary to remove the chassis from the cabinet. The aligning capacitors for the intermediate frequency circuits of these receivers are easily accessible from the rear of the receiver, and the aligning capacitors for the radio frequency circuits are accessible through the aperture located in the bottom metal base plate of the chassis. These apertures are easily accessible either through the bottom of the cabinet or through the bottom of the cabinet shelf depending upon the style of cabinet. See Figure 2.

Dial Adjustment

Before aligning the circuits of any of these receivers, the tuning dial must be properly aligned to track with the gang tuning capacitors. To check whether the dial is set correctly with respect to the gang tuning capacitor, rotate the "Station Selector" knob in a clockwise direction so that the gang tuning capacitor is set to its maximum capacity position. Then, with the gang tuning capacitor in this position, the dial pointer should center over the middle vertical line of the three vertical lines located on the glass dial and the vertical lines located on the metal pan of the dial frame. Now, rotate the "Station Selector" knob so that the dial pointer lines up with the horizontal lines located on the metal pan of the dial frame; with the pointer in this position the two horizontal center marks of the glass dial (located at approximately 9.3 megacycles on the right hand scale and 2.16 megacycles on the left hand scale) should also be in alignment with the dial pointer. If the above conditions are not obtained, loosen the four clamps which hold the glass dial to the dial pan by slightly loosening the four screws, and shift the glass dial so that a good alignment between the dial pointer, the glass dial, and alignment marks located on the metal pan of the dial frame is obtained for both the horizontal and vertical position of the dial pointer.

Intermediate Frequency Adjustments

The intermediate frequency used in these receivers is 465 kilocycles. In making these circuit adjustments always align the circuits in the order given in these instructions.

1. Operate the "Range" switch of the receiver to the "A" range position. Set the receiver's tuning dial at its extreme low frequency position, and operate the Tone Control knob to the "Normal" position. Rotate the Volume Control knob to its maximum clockwise position (maximum volume).

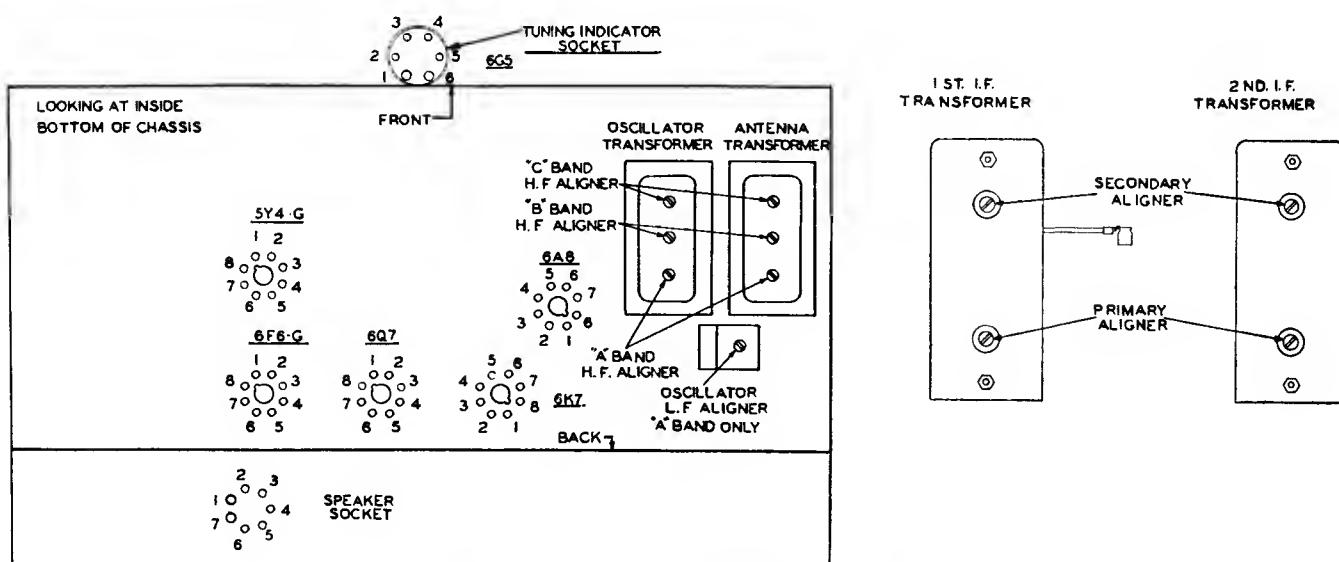


Fig. 1. Terminal Layout for Voltage Measurement Chart and Location of the Various Aligning Capacitors.

2. Apply between the chassis base (or ground binding post) of the receiver and the grid of the No. 6A8 modulator-oscillator tube, a modulated signal of 465 kilocycles from the test oscillator, using a 0.1 microfarad capacitor in series with the connection between the output terminal of the test oscillator and the grid of the No. 6A8 tube. Do not remove the chassis grid lead connecting to this tube. The ground (or low side) terminal of the test oscillator should be connected to either the chassis base or the ground binding post terminal.
3. Now, noting from Figure 1, the aligning capacitors for the first and second I. F. transformers, align the I. F. circuits in the following manner:

Secondary of second I. F. transformer.

Primary of second I. F. transformer.

Secondary of first I. F. transformer.

Primary of first I. F. transformer.

Adjusting the circuits to obtain maximum reading on the output meter, reducing the output of the test oscillator as required.

Radio Frequency Adjustments

The alignment of the radio frequency circuits of the various ranges in these receivers should be very carefully made and in the order specified.

Alignment of Short Wave Range (Also Referred to as "C" Band)

In aligning the radio frequency circuits for this range, replace the 0.1-microfarad capacitor which was placed in series with the test oscillator's output lead for the I. F. alignments, with a 400-ohm carbon type resistor. This lead should then be connected to the antenna binding post located on the rear of the receiver chassis. The ground terminal (or low side) of the test oscillator should be connected to the ground binding post on the receiver.

1. Operate the Range Switch on the receiver chassis to the "C" range position, and set the test oscillator's frequency and the receiver's tuning dial to 17 megacycles.
2. Adjust the oscillator's "C" band high frequency aligner for maximum output.
3. Adjust the antenna's "C" band high frequency aligner for maximum output, at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.

Alignment of Aircraft, Amateur, and Police Range (Also Referred to as "B" Band)

In aligning the radio frequency circuits for this range, use the same artificial antenna (400-ohm carbon type resistor) in series with the output terminal of the test oscillator as was used for aligning the short-wave range.

1. Operate the Range Switch on the receiver chassis to the "B" range position, and set the test oscillator's frequency and the receiver's tuning dial to 3.4 megacycles.
2. Adjust the oscillator's "B" band high frequency aligner for maximum output.
3. Adjust the antenna's "B" band high frequency aligner for maximum output, and at the same time rotate the gang tuning capacitor back and forth through resonance until maximum output is obtained.

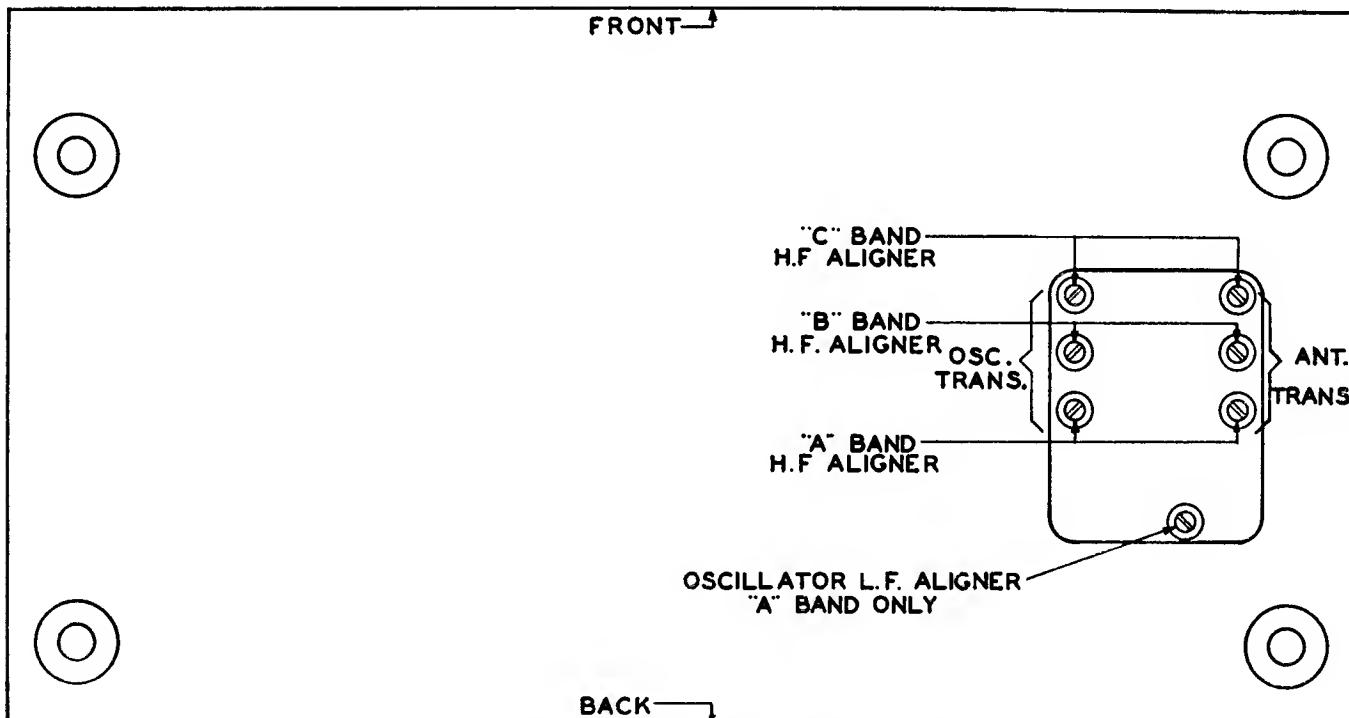


Fig. 2. View Through Chassis Mounting Shelf Showing Adjusting Screws for R. F. Aligning Capacitors.

Alignment of Standard Broadcast Range (Also Referred to as "A" Band)

In aligning the radio frequency circuits for this range, replace the 400-ohm carbon type resistor in series with the test oscillator's output lead with a 200-micro-microfarad capacitor and align these circuits as follows:

1. Operate the Range Switch to the "A" range position and set the test oscillator's frequency and the receiver's tuning dial to 1.4 megacycles.
 2. Adjust the oscillator's "A" band high frequency aligner for maximum output.
 3. Adjust the antenna's "A" band high frequency aligner for maximum output.
 4. Set the test oscillator's frequency and the receiver's tuning dial to 0.6 megacycles.
 5. Adjust the oscillator's "A" band low frequency aligner (series aligner) for maximum output, and at the same time rotate the gang tuning capacitor slightly back and forth through resonance until maximum output is obtained.
 6. Reset both the test oscillator's frequency and receiver's tuning dial to 1.4 megacycles and repeat operations Nos. 2 and 3.

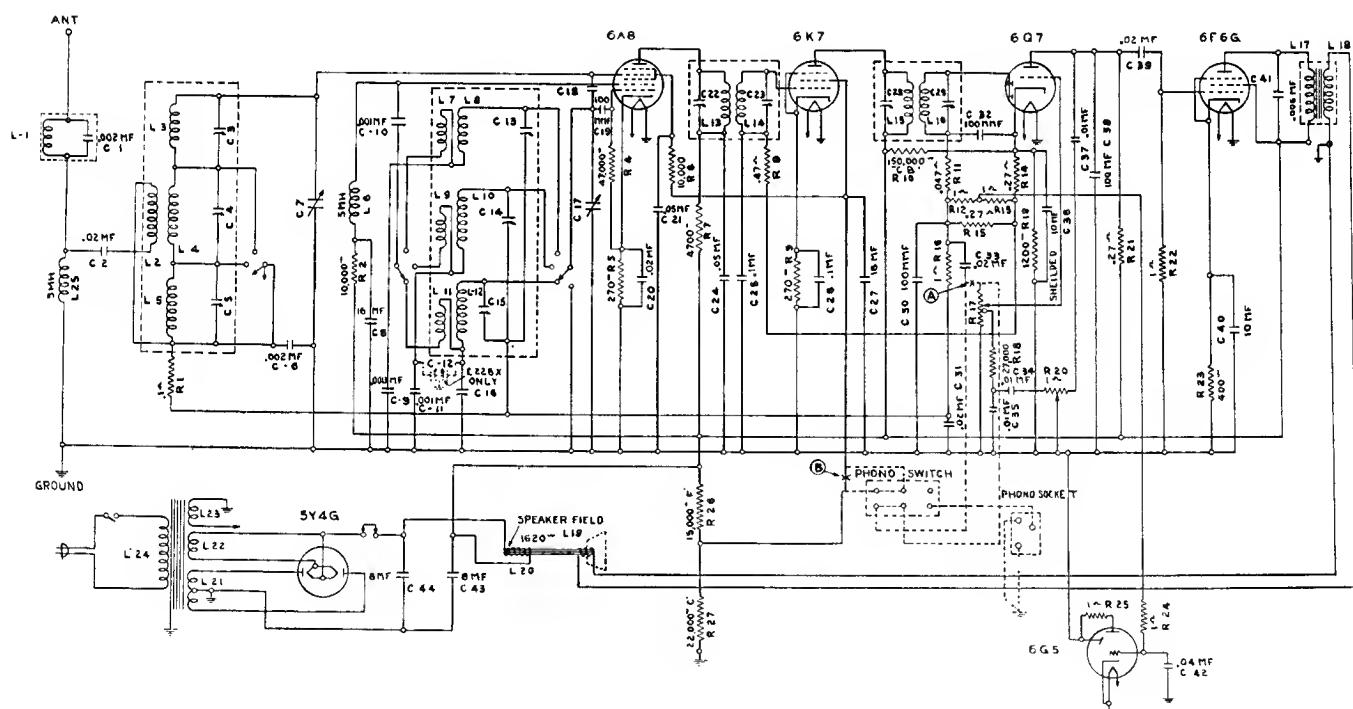


Fig. 3. Schematic Circuit of Receiver.

REPLACEMENT PARTS

| Piece Number | Schematic Circuit Designation | Part |
|--------------|-------------------------------|---|
| 23357 | R27 | Resistor, Type "C", 22,000 Ohms |
| 23517 | . | Tube Socket, 7 Prong |
| 24268 | . | Cord, Power Supply |
| 24402 | C25, C26 | Capacitor, .1 Mfd. |
| 24405 | C42 | Capacitor, .04 Mfd. |
| 24559 | C30, C32 | Capacitor, Type "O", 100 Mmfd. |
| 24994 | C 21, C24 | Capacitor, .05 Mfd. |
| 25149 | C34, C35, C37 | Capacitor, .01 Mfd. |
| 25150 | C2, C20, C31, C33, C39 | Capacitor, .02 Mfd. |
| 25487 | C10 | Capacitor, Type "W", .001 Mfd. |
| 25488 | C1, C6 | Capacitor, Type "W", .002 Mfd. |
| 25489 | C9 | Capacitor, Type "W", .00125 Mfd. |
| 25500 | R28 | Resistor, Flexible Type, 400 Ohms |
| 25504 | C19, C38 | Capacitor, Type "2", 100 Mmfd. |
| 25500 | L15, L16 | 2nd I. F. Transformer |
| 25513 | L1 | Coil Assembly, Wave Trap |
| 25526 | R26 | Resistor, Type "P", 15,000 Ohms |
| 25583 | C41 | Capacitor, .006 Mfd. |
| 25539 | . | Tube Socket, 8 Prong |
| 25814 | L6, L25 | Coil Assembly, R. F. Choke |
| 20029 | C22, C23, C28, C29 | Aligning Capacitors, I. F. Transformers |
| 26039 | C3, C4, C5 | Aligning Capacitors, Antenna Transformer Assembly |
| 26057 | C7, C17 | Gang Tuning Capacitors |
| 26113 | L2, L3, L4, L5 | Coil Assembly, Antenna Transformer |
| 26121 | L13, L14 | 1st I. F. Transformer |
| 26157 | L7, L8, L9, L10, L11, L12 | Coil Assembly, Oscillator Transformer |
| 26161 | C13, C14, C15 | Aligning Capacitors, Oscillator Transformer Assembly |
| 26172 | . | Range Switch |
| 26287 | . | Dial Lamp |
| 26326 | R5, R9 | Resistor, Type "E", 270 Ohms |
| 26334 | R19 | Resistor, Type "E", 1200 Ohms |
| 26341 | R7 | Resistor, Type "E", 4700 Ohms |
| 26345 | R2, R6 | Resistor, Type "E", 10,000 Ohms |
| 26353 | R4, R11 | Resistor, Type "E", 47,000 Ohms |
| 26357 | R1 | Resistor, Type "E", .1 Megohm |
| 26362 | R14, R15, R21 | Resistor, Type "E", .27 Megohm |
| 26365 | R8 | Resistor, Type "E", .47 Megohm |
| 26369 | R12, R13, R16, R22, R24, R25 | Resistor, Type "E", 1 Megohm |
| 26417 | C18 | Capacitor, Neutralizing |
| 26727 | C11 | Capacitor, Type "W", .001 Mfd., Oscillator "B" Range L. F. Padder |
| 26747 | C16 | Capacitor, Oscillator "A" Range L. F. Aligner |
| 27099 | . | Pilot Lamp Socket |
| 27289 | . | Dial Assembly |
| 27408 | . | Tuning Indicator Socket and Cable |
| 27550 | L17, L18 | Transformer Assembly, Audio Output |
| 27552 | C43, C44 | Electrolytic Capacitor; 8 Mfd., 350 Volts, and 8 Mfd., 400 Volts |
| 27553 | C8 | Electrolytic Capacitor; 16 Mfd., 200 Volts |
| 27554 | C27 | Electrolytic Capacitor; 16 Mfd., 100 Volts |
| 27555 | L21, L22, L23, L24 | Power Transformer (50 to 60 Cycles Chassis) |
| 27556 | L21, L22, L23, L24 | Power Transformer (25 to 60 Cycles Chassis) |
| 27610 | R17 | Volume Control |
| 27615 | R18 | Resistor, Type "EI", 27,000 Ohms |
| 27619 | C36, C40 | Electrolytic Capacitors; 10 Mfd., 25 Volts and 10 Mfd., 25 Volts |
| 27627 | . | Pilot Lamp Socket |
| 27637 | R20 | Off-On-Switch and Tone Control |
| 27640 | R10 | Resistor, Type "CB", 150,000 Ohms |

MISCELLANEOUS PARTS

| Piece Number | Part |
|--------------|---|
| 26296 | Knob (Used on Volume, "On-Off" Switch and "Tone" Control and Station Selector Controls). Used only on No. 228-H Receivers. 3 required |
| 27351 | Knob (For Range Switch). Used only on No. 228-H Receiver |
| 26302 | Knob (For Volume Control). Used only on No. 228-L Receiver |
| 27790 | Knob (For Station Selector Control). Used only on No. 228-L Receiver |
| 27791 | Knob (For Range Switch). Used only on No. 228-L Receiver |
| 26384 | Knob (For "On-Off" Switch and "Tone" Control). Used only on No. 228-L Receiver |
| 26070 | Felt Washer (For use on Control Shafts of No. 228-H Receiver) |
| 26071 | Felt Washer (For Use on Control Shafts of No. 228-L Receiver) |

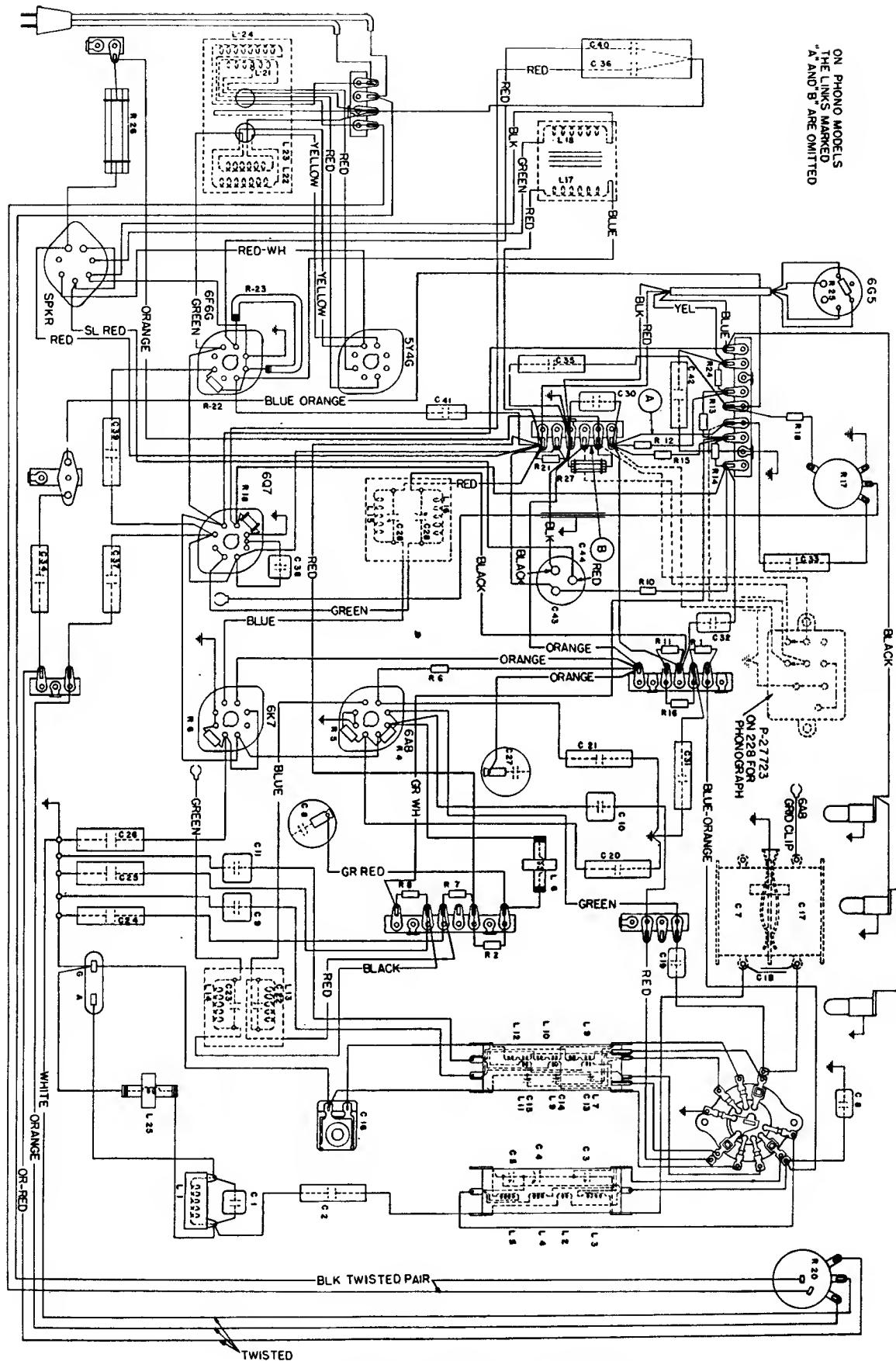


Fig. 4. Wiring Diagram, No. 228 Receiver.

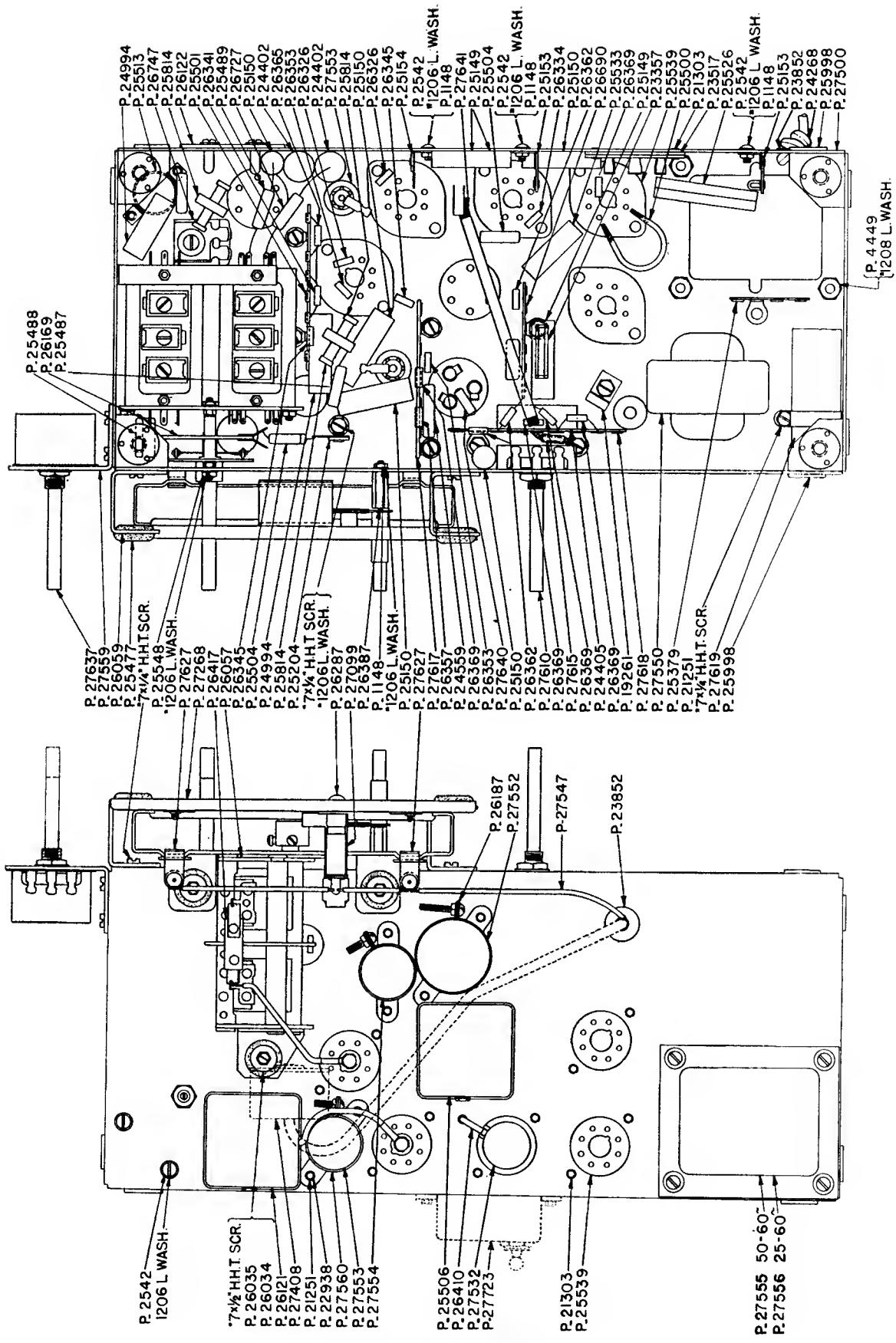


Fig. 5. Chassis Assembly.